
Cortinarius brunneovolvatus

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# *Cortinarius brunneovolvatus* A. Mateos & J.D. Reyes, *sp. nov.*

*Etymology*. The first part of the epithet ('*brunneo*') refers to the general brown colour of the basidiomata, the second part ('*volvatus*') refers to the fact that it is provided with a veil covering the stipe in the form of a volva.

Classification — *Cortinariaceae*, *Agaricales*, *Agaricomycetes*.

*Basidiomata* of medium size, growing gregarious to fasciculate, with a sordid appearance ven when young. *Pileus* 50–70(–90) mm diam, convex to plano-convex when young, flat to depressed in developed specimens, with a broad obtuse umbo and wavy margin, incurved at first but later straight, sometimes somewhat incised; cuticle reddish brown (Séguy 1936: 146), dark (126) to sordid (177), a bit hygrophanous, with a large amount of white veil in the centre and fibrillose remnants towards the margin, which is somewhat exceeding. *Lamellae* spaced, widely spaced at maturity, emarginate, with abundant short and long lamellulae, up to 10 mm thick, with a wavy and sometimes somewhat serrate edge; beige when young (190) but soon reddish brown (187, 191). *Stipe* 50–70(–120) × 10–15 mm, cylindrical to claviform, with a bulbous base up to 25 mm thick, recurved, with a fibrillose surface presenting white velar remnants in the lower half, more abundant at the base and finally disappearing elsewhere, with silver fibrils at the apex; reddish brown, paler towards the top (202, 187). *Context* firm, reddish brown in the centre of the pileus (161), paler towards the top of the stipe (162), greyish brown towards the base (200), *odour* slightly earthy, *taste* not remarkable. *Exsiccatae*: pileus sordid brown to dark greyish brown, especially in the centre; stipe brownish grey. *Macrochemical reactions*: KOH, on cuticle dark brown, on flesh somewhat brownish at the pileus and subnull elsewhere; Guaiac, ++ rather fast. *Basidiospores* ellipsoid to subamygdaliform, with ornaments consisting of evenly distributed isolated warts of medium height and thickness, (8–)8.9–*9.5*–10.3(–11.3) × (4.9–)5.5–*6.1*–6.7(–7.5) µm; Q = (1.4–)1.5–*1.6*–1.7(–1.8); n = 80; Vm = 189 µm$^3$, sometimes with large central oil droplets. *Lamellar edge* fertile or without true cystidia, with scattered basidioliform banal cells. *Hymenophoral trama* consisting of 3–10 µm wide cylindrical hyphae, with greyish parietal pigment and sometimes with vacuolar pigmentation. *Basidia* claviform, tetrasporic, 25–35 × 8–10 µm, with stigmata 2–4 µm long. *Pileipellis* consisting of a duplex cutis (Type 1 according to Bidaud et al. 2004). *Epicutis* formed by a thin layer of radial hyphae of (3–)4–8(–14) µm, with few free and hardly differentiated tips, and greyish brown parietal incrusted pigment. *Subcutis* well differentiated from the epicutis, consisting of a layer of subcellular elements of 17–23 µm diam, with brownish parietal pigmentation. *Clamp connections* present in all tissues.

Habitat & Distribution — Gregarius and caespitose, in large groups among leaf litter of *Quercus ilex* subsp. *ballota*, on rich calcareous soils, in Mediterranean sclerophyllous mountain forest in Sierra Mágina, Subbetic System (southern Iberian Peninsula), consisting of *Q. ilex* subsp. *ballota*, *Q. coccifera* and *Pinus* spp. The existence of an ITS sequence in GenBank (HQ204636.1) of ectomycorrhizal communities in a Mediterranean forest ecosystem dominated by *Quercus ilex* which is almost identical to that obtained in the present study indicates the presence of *C. brunneovolvatus* in the *Q. ilex* forests of France.

*Typus.* Spain, Jaén, Cambil, Parque Natural Sierra Mágina, Gibralberca, N37°40'45.74" W3°29'8.26", 1 240 m a.s.l., gregarious growth, under *Quercus ilex* subsp. *ballota* in calcareous soil, 7 Dec. 2012, *A. Mateos* (holotype AMI 3752, ITS sequence GenBank MW752903, MycoBank MB 839028).

*Additional materials examined*. Spain, Jaén, Cambil, Parque Natural Sierra Mágina, Gibralberca, 1 200 m a.s.l., fasciculate growth, under *Quercus ilex* subsp. *ballota* in calcareous soil, on 7 Dec. 2012, *A. Mateos*, AMI 3751, ITS sequence GenBank MW752904; ibid., 21 Dec. 2012, gregarious growth, *J.D.D. Reyes*, JDRG2112200101, ITS sequence GenBank MW752905.

Phylogeny — The final alignment included 663 bp of which 153 were variable and 108 were parsimoniously informative among 31 sequences (three newly generated, 28 retrieved from public databases). For the elimination of ambiguously aligned sites, this alignment was optimised in GBlocks (Castresana 2000) with the least restrictive parameters resulting in 501 positions, of which 376 were conserved, 125 variable, 89 parsimoniously informative and 36 singletons. JModeltest v. 2.1.4 (Darriba et al. 2012) was used to select the best nucleotide substitution model, using the Akaike Information Criterion (AIC, Akaike 1974) analysis. The GTR+I+G model was selected. Maximum likelihood (ML) and Bayesian inference (BI) analyses were performed using Geneious v. 6.1.7. Supporting statistical nodes in the ML analyses were inferred from 1 000 bootstrap replicates. Phylogenetic trees were drawn with FigTree v. 1.4, and finally adapted in Adobe Illustrator CS5.

Notes — *Cortinarius brunneovolvatus* has as characteristic morphological characters, chestnut-brown colour of its basidiomata, the large amount of white veil remnants on the pileus and thickly covering bulbous base of stipe, and its ellipsoid to subamygdaliform spores with medium-sized ornaments. However, these features are present also in several species of *Telamonia* s.lat. and, more specifically, in the sections *Brunnei*, *Sordescens* and *Lanigeri* (Brandrud et al. 1989, 1992, 1994, 1998, Melot 1990, Bidaud et al. 2002, 2009), as well as other species in section *Bovini* where *C. brunneovolvatus* is nested, based on phylogenetic analyses, as well as morphological evidence representing the type species *C. bovini* ((Brandrud et al. 2012: pl. E20, Niskanen et al. 2013). Section *Bovini* (Moser & Horak 1975), underwent several modifications by its original author (Moser 1978, 1983, 2001, Moser et al. 1995), who included several European and South American species, one North American species (*C. pseudobovinus*) and others from the Southern Hemisphere. Subsequently, Bidaud et al. (2009) added some new species and suggested several other modifications.

(text continues on Supplementary material page FP1235)

*Colour illustrations*. Spain, Cambil, Sierra Mágina Natural Park, forest of *Q. ilex* subsp. *ballota*, where the holotype of *Cortinarius brunneovolvatus* was collected (AMI 3752). Basidiomata in upper photo correspond with the holotype; middle photo corresponds with AMI 3751 and the bottom photo is JDRG2112200101; holotype basidiospores. Scale bar = 10 µm.

**Supplementary material**

**FP1235-1** Key to the related species of section *Bovini.*

**FP1235-2** Phylogram depicting the evolutionary relationships of *Cortinarius brunneovolvatus* and its relatives based on ITS sequence data.

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